

#### **3.4.4 Alaska Region**

The workshop discussions in the Alaska region began by focusing on ecosystems in marginal ice areas and the methods by which these ecosystems adapt in such an abruptly changing environment. Additional discussion emphasized areas of the seafloor that had been previously scoured by glaciers. One item that had unique attention in this workshop was the interest in the exploitation of traditional local knowledge—indigenous inhabitants of the region—to help establish a knowledge baseline for facilitating exploration beyond the usual application of scientific knowledge.

This workshop provided a forum for participants to emphasize the true frontier nature of the region. Much of the Alaska region is unexplored due to its size and the extreme wintertime environment. The lack of existing knowledge led the attendees to focus on the application of ocean exploration in relative large regional areas rather than specific targets. Likewise, considerable attention among the participants was devoted to ocean exploration during the winter season since so few observations are made during this time and much remains to be learned about the wintertime ocean environment.

The Alaska region workshop results are provided in Table 3-6. Exploration targets of interest nominated by participants are illustrated in Figure 3-6.

**Table 3-6. Alaska Region Workshop Results**

<b>Alaska Workshop</b>	
<b>Standard Package:</b> Class I/II Vessel with acoustic mapping; Dive capability (ROV/AUV/ Submersible) with imagery/video and sampling equipment; Precise positioning system; bench mounted ocean instruments; good pumped water (rapid input); gas detection system; ADCP; bioacoustics profiling system; multibeam system; sediment and rock sampling system; bongo tow	<b>Standard Partners:</b> NOAA (Office of Marine and Aviation Operations (OMAO); NESDIS; NOS; Coast Survey); NURP; NMFS; Air Force Civil Engineering (AFCE); NOPP; University of Alaska; Oregon State University; University-National Oceanographic Laboratory System (UNOLS) Community; Alaska Native Science Communities; MMS; USGS; Prince William Sound Science Center; North Pacific Research Board; US Fish & Wildlife Service

<b>Alaska Workshop Results</b>						
<b>ID</b>	<b>Category</b>	<b>Information Need/Gap</b>	<b>What</b>	<b>Where</b>	<b>Enabling Technologies</b>	<b>Partners</b>
171	Archeology	Shipwrecks including, pre WWII, WWII and Later Human Sites	Location and characterization of site; documentation of artifacts; document effects on ecosystems and food chain	Western Aleutian Islands; Kiska Island; Duke Island (SE AK); Attu Island; SE Alaska; Lynn Canal	Standard Package; archive searching; special equipment for artifacts - lab facilities for preservation & stabilization; human diving	Standard Partners; Museums; Salvage Organization; State Historic Preservation Office
175	Archeology	Archeological Information on Human Migration	Location and characterization ancient villages; Document migration routes; Document ice records	Fairweather Ground	Standard Package; archive searching; special equipment for artifacts - lab facilities for preservation & stabilization; human diving; very high resolution side scan (w/ backscatter data)	Standard Partners; Museums; Salvage Organization; State Historic Preservation Office
160	Benthic Environment	Relationship of Benthic Features and Essential Fish Habitats	Catalogue the distribution and abundance of the types of species that are in the mesopelagic zone; document the benthic habitats that support important ecosystem components including fish and rare or special species and essential fish habitats	Continental shelf; Gulf of Alaska; Bering Sea; Chukchi Sea; shelf edge and basin of Gulf of Alaska	Standard Package; bottom profiling technologies; optics; satellites; nets; tagging; underwater visual technology; pop-up satellite archival tags (PSATS)	Standard Partners; Fishing industry
170	Currents & Water Masses	Circulation survey	Document subsurface currents	Western Alaska; Nome; Bering Sea; Chukchi Sea	Standard Package; moorings; remote sensing	Standard Partners

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181	Currents & Water Masses	Need data and information on large-scale circulation and variability of Beaufort Gyre	Explore largest freshwater reservoir	Beaufort Sea / Arctic Ocean	Standard Package; remote sensing; autonomous platforms; ice-going vessels; moorings	Standard Partners; Canadian Government (Earth Science Sector)
159	Ecosystem	Bering Sea fish habitats	Use bathymetry to understand sediments and habitat; use hydrography for better understand of tidal data; understand temporal nature of biology	Gaps in data of Bering Sea - Bristol Bay	Standard Package; Ships of opportunity; interferometric side scan sonar (true swath bathymetry and true backscatter)	Standard Partners; commercial partners; fishing industry
344	Ecosystem	Alaska Region Ecosystems	Comparison of transects across the eastern, central, and western Aleutians	Aleutians	Standard Package	Standard Partners
147	Ecosystem - Abrupt Topography	Fjords of southeast and south central Alaska	Contrast recent glaciated landscapes to more stable and tidewater to non-estuaries; compare tidewater glacial vs. nonglacial; document substrates for habitat mapping; detect species distributions; determine some of physical and biological effects of deglaciation (they have complex oceanographic regimes and teasing out would be good)	Glacier Bay; Prince William Sound; Icy Bay; Substrates for habitat mapping; especially the deep and dynamic fjords	Standard Package; CTD; divers; ships of opportunity; HDTV; Remote Sensing Satellite (ASTER; LANDSAT 7)	Standard Partners; Cruise lines
152	Ecosystem - Abrupt Topography	Aleutian Trench	Inventory and document geology (improved mapping) and habitats esp. corals and methane seeps; document these trophic systems; identify new species	From start to very end of Aleutian Chain	Standard Package; Coring; deep vehicle capabilities; high pressure samplers; deep tow; rock dredging	Standard Partners; JAMSTEC
153	Ecosystem - Abrupt Topography	Aleutian Arc	Examine the structural arc; examine substrates and patterns of coral distribution; document hydrothermal venting and volcanism; document biodiversity; biology; and oceanography	Region between the islands and north of the Arc (abyssal plain); from southern boundaries of the platforms; north to abyssal plain of the Bering Sea	Standard Package; water column methane sniffing; AUVs for mapping broad shallow areas of continental shelf (Much better than using surface ship. MBARI has developed vibracoring system which could be adapted for this project); Coastal Detection and Ranging (CODAR)	Standard Partners; Russia

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154	Ecosystem - Abrupt Topography	Canyons	Document rate of the consumption of the physical plate; geochemistry; sediment transport; and volcanism; examine biology of area; and hot springs seeps; examine these very interconnected physical systems; inventory and document geology (improved mapping)	Southeast Alaska; Aleutians; Deep Canyons in Aleutian Fore Arc (POC - Phillip Rigby and Gene Yogodzinski); Bogoslov; near sub volcanoes; Bering Sea Canyon; Kodiak Seamount	Standard Package; submersible (7000 m) technology that allows you to hold station in strong current; trawls; nets; visualization techniques; physical oceanography tools	Standard Partners
168	Ecosystem - Abrupt Topography	Submarine seamounts	Document evolution of seamounts; circulation; and currents; document these ecosystems esp. in the deep water	South central Gulf of Alaska (Gulf of Alaska Seamount Province) e.g. Pratt-Welker Chain; Patton Murray Chain; South of the trench (e.g. Adak Island; Central Aleutians; Atka Island)	Standard Package; new technology (e.g. video to speed up processing); HDTV	Standard Partners; MBARI; Navy
151	Ecosystem - Extreme Environment - Sea Ice	Characterize and explore extreme environments	Characterize and explore high salinity and low temp environments	Bering Basin / Arctic Ocean	Standard Package; extreme cold technology; biochemical genetic screening; tagging; remote sensing; ice breaker ships; thermal imaging; Nation Technical Means; aircraft; acoustic monitoring	Standard Partners; Industry; Navy; US/Canadian/Russian Coast Guard; NSF; Arctic Logistics; Barrow Arctic Science Consortium (BASC); VECO Corp.
162	Ecosystem - Extreme Environment - Sea Ice	Seasonal (winter) exploration	Biological; geological; cryosphere; biological and physical oceanography	Continental Shelf spawning area; Bering Sea (Bristol Bay; northern Bering Sea e.g. along the ice edge; central Arctic Basin; whole ice edge); Cook Inlet (issue - other organizations working on it).	Standard Package; extreme cold technology; biochemical genetic screening; tagging; remote sensing; ice breaker ships; thermal imaging; Nation Technical Means; aircraft; acoustic monitoring; full blown submarines	Standard Partners; Industry; Navy; US/Canadian/Russian Coast Guard; NSF; Arctic Logistics; BASC; VECO Corp.
163	Ecosystem - Extreme Environment - Sea Ice	Sea ice	Document biology and physical processes going on; Ballena studies; Increased fetch (expanded open ocean); document change in migration patterns; role of sea ice cover in structuring the marine ecosystem; how does it vary with latitude	Nearshore reefs e.g. Camden Bay. Along Arctic barrier islands. Some of the Bering Sea Islands for coastal erosion. Beaufort Seas; Chukchi Sea; Bering Sea	Standard Package; extreme cold technology; biochemical genetic screening; tagging; remote sensing; ice breaker ships; thermal imaging; Nation Technical Means; aircraft; acoustic monitoring; vessels of opportunity; ice-going vessel; ice moorings; autonomous platforms	Standard Partners; Industry; Navy; US/Canadian/Russian Coast Guard; NSF; Arctic Logistics; BASC; VECO Corp.

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177	Ecosystem - Extreme Environment - Sea Ice	Wintertime trophic food web	Identify and catalogue the trophic webs that support birds and mammals in the wintertime; look at what physical processes impact their system; what zooplankton are available for species dependent on their food type; document water column biology (zooplankton)	South Bering Sea; Aleutian Islands (wintertime)	Standard Package; extreme cold technology; biochemical genetic screening; tagging; remote sensing; ice breaker ships; Thermal Imaging; Nation Technical Means; aircraft; acoustic monitoring; biophysical moorings (winter); new sampling technologies	Standard Partners; Industry; Navy; US/Canadian/Russian Coast Guard; NSF; Arctic Logistics; BASC; VECO Corp.
343	Ecosystem - Extreme Environments - Vents, Seeps, & Volcanoes	Hydrothermal vents	Locate isolated biologic communities and sea floor mineral masses	Ingenstrem Depressions; scarps and related basins; many of the pull-apart basin located along the volcanic line west of Kiska	Standard Package	Standard Partners
166	Ecosystem - Shorelines to Ledges	Intertidal zones	Document biodiversity and taxonomy; identify and characterize; document archeology.	Aleutian Islands; Islands in Gulf of Alaska e.g. Shumagins; Kodiak Island Group; Alaskan Peninsula	Standard Package; via helicopters from ships and Alaska Peninsula; standard biological sampling; LIDAR; acoustic monitoring	Standard Partners; Cruise lines
157	Ecosystem - Slopes	Continental rise and the outer continental shelf, down to the abyssal floor plain	Document biological communities and geologic history; examine this record of continental climate	Arc of the Gulf; Gulf of Alaska continental margin; Bering Sea; e.g. at the base of the margin cutting the canyons	Standard Package; Suite of geological and biological sampling devices; backscatter data; seismic reflection	Standard Partners; Various Commercial Partners
148	Geology & Geomorphology	Documenting climate variability (Molnia)	500 million year record of global climate; need to examine it to look for variability	Molnia	Standard Package; high resolution geophysics; coring	Standard Partners; Various Commercial Partners
149	Geology & Geomorphology	Glaciers (Molnia)	How did the glaciers existing in the Bering Sea change over time?; explore environment created and released by retreating or advancing glaciers; identify and characterize these environments	Gulf of Alaska continental shelf between Cook Inlet to Canadian Border; southeast Alaska; Glacier Bay	Standard Package; high resolution geophysics	Standard Partners; various commercial partners

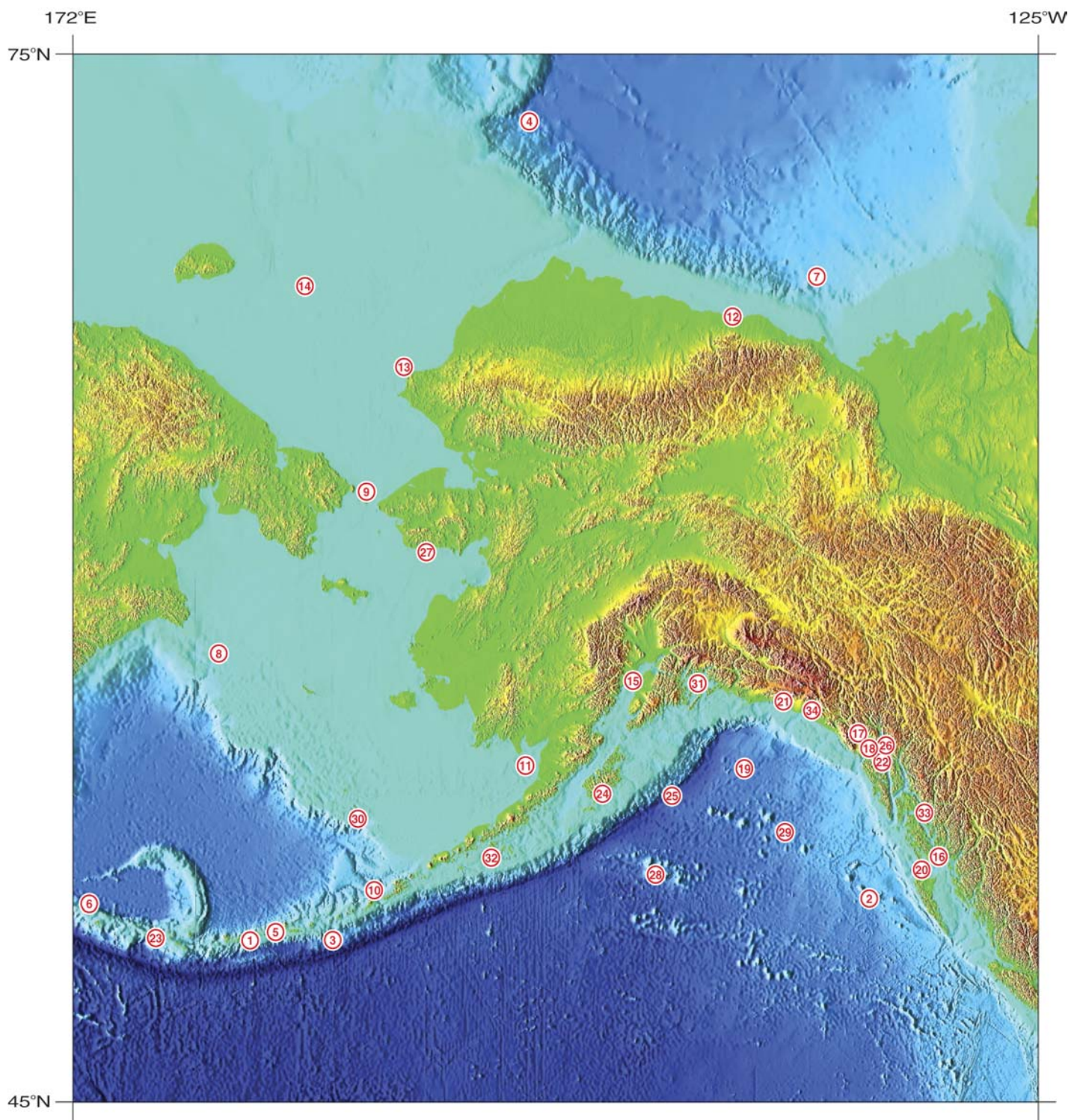
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165	Geology & Geomorphology	Plate boundary - strike slip system	Map and perform water column survey; identify and characterize biota	Icy strait - Canadian border to Alsek River; South of Icy Strait; Fairweather Fault; Yakutat Terrain	Standard Package; basic surveying tools	Standard Partners; Canadian Government (Earth Science Sector); Petroleum Corporations
158	High Resolution Bathymetry	Mapping	Collect hydrographic; bathymetric and tidal data - mean low and high water; document navigation hazards; and biota	Western and northern Alaska; Bristol Bay; Arctic Basin; Bering Sea; Bering Strait; Bering Sea (data gaps areas); North of Sag River; entire shoreline of Beaufort Sea; Cape Lisbourne	Standard Package; tide gauges; Backscatter processing; fathometers in shallow water; LIDAR	Standard Partners
173	Human Impacts	Hazard dumps	Determine location and chemistry of material; characterize these sites	Aleutians	Standard Package; hazard sampling techniques; underwater moorings	Standard Partners
161	Marine Conservation	Essential fish habitat	Map and inventory benthic habitats to gain knowledge and understanding impacts of essential fish habitats; candidate areas of protection	Pribilof Canyons; between Aleutians and shelf break	Standard Package	Standard Partners; fishing industry
178	Marine Microorganisms	Microbes in the Bering and Chukchi Sea	Microbiology and micro-zooplankton sampling; What are the abundant and important microbes and micro-zooplankton of the Bering and Chukchi Sea; gain knowledge of ecosystem health; understand long-term variability	Chukchi Sea; Bering Sea	Standard Package; specialized sampling and growth chambers; microscopy	Standard Partners
179	Marine Microorganisms	Microscopic interfaces	Explore unknown micro- / nano- environment; characterize it including information on microscopic interfaces of chemistry; microbiology (liquid-solid interface)	Shelf; shallow water	Standard Package; micro sampling; micro- and nano-technologies	Standard Partners

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180	Marine Organisms	Where do high latitude organisms go to spend winter	Support for designation of critical habitats	Polynyas - St. Lawrence; Sereniki; St. Matthew	Standard Package; biological and physical tools; benthic sampling; ice breakers; remote sensing; aircraft	Standard Partners; Industry; Navy; US/Canadian/Russian Coast Guard; Native Communities; NSF; Arctic Logistics; BASC; VECO Corp.
176	Ocean Resources - Energy & Minerals	Gas hydrates	Document interaction w/ ocean; Identify and characterize communities associated with them; Map distribution and location; Assess VAMP (Velocity Amplitude) Structures	Deep Gulf of Alaska; Beaufort; North Slope; Chukchi; Wrangall Island; Bering Sea Basin	Standard Package; seismic profiling; sniffers	Standard Partners
167	Sound in the Ocean	Characterize naturally occurring sounds	Listen to seismic acoustics; fauna acoustics; Marine mammals; and fish; Use acoustics to determine migration paths	Aleutians; SE Alaska; Aleutian Arc; Bering Sea	Hydrophones; observing system(s)	Standard Partners

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## **Alaska Region Exploration Targets of Interest**

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|---------------------------------|--|
| 1. Adak Island (Aleutian Chain) | 19. Gulf of Alaska (between Cook Inlet and Canada) |
| 2. Bowie Seamount Chain         | 20. Haida Villages                                 |
| 3. Aleutian Fore Arc            | 21. Icy Bay  |
| 4. Arctic Basin/Ocean           | 22. Icy Strait                                     |
| 5. Atka Island (Aleutian Chain) | 23. Kiska Island (Aleutian Chain)                  |
| 6. Attu Island (Aleutian Chain) | 24. Kodiak Islands                                 |
| 7. Beaufort Sea (shoreline)     | 25. Kodiak Seamount                                |
| 8. Bering Basin/Sea             | 26. Lynn Canal                                     |
| 9. Bering Strait                | 27. Nome   |
| 10. Bogoslof                    | 28. Patton Murray Chain                            |
| 11. Bristol Bay                 | 29. Pratt-Welker Chain                             |
| 12. Camden Bay                  | 30. Pribilof Canyon                                |
| 13. Cape Lisbourne              | 31. Prince William Sound                           |
| 14. Chukchi Sea                 | 32. Shumagins                                      |
| 15. Cook Inlet                  | 33. Wrangell Island                                |
| 16. Duke Island                 | 34. Yakutat Terrain                                |
| 17. Fairweather Fault           |  |
| 18. Glacier Bay                 |  |



**Figure 3-6. Alaska Region Exploration Targets of Interest**